

# **Environmental Assessment Assessment of Effect**

## **FIRE MANAGEMENT PLAN George Washington Carver National Monument Missouri**

**2004**

### **Summary**

National Park Service (NPS) policy requires that any NPS area with combustible vegetation prepare a Fire Management Plan. Four alternatives were considered for the Fire Management Plan: a no-action alternative, two action alternatives, and a no management alternative. The proposed alternative is to suppress all unscheduled ignitions using the most appropriate suppression response, and implement resource management and fuels reduction projects using mechanical and chemical treatments and prescribed burning. The alternative that proposes wildland fire use for resource benefit was considered and rejected. The no management alternative was considered and rejected because it does not meet the purpose and need, could threaten the integrity of George Washington Carver National Monument (GWCA) cultural resources and cultural landscapes; and does not ensure the safety of park visitors and employees, and surrounding landowners. This environmental assessment assesses impacts to air quality, cultural resources, visitor experience, vegetation, and wetlands/floodplains; and describes cumulative effects of each alternative.

### **Public Comment**

Note to Reviewers and Respondents:

If you wish to comment on this environmental assessment, you may mail comments to the name and address below. This environmental assessment will be on public review for 30 days. Please note that names and addresses of people who comment become part of the public record. If you wish us to withhold your name and/or address, you must state this prominently at the beginning of your comment. We will make all submissions from organizations, businesses, and individuals identifying themselves as representatives or officials of organizations or businesses, available for public inspection in their entirety.

**Scott J. Bentley  
Superintendent  
George Washington Carver National Monument  
5646 Carver Road  
Diamond, MO 64840**

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## INTRODUCTION

George Washington Carver National Monument (GWCA) is composed of a 210-acre tract of land in Newton County, Missouri. GWCA is located thirteen miles southeast of Joplin and fourteen miles northeast of Neosho. The park contains a visitor center, museum, maintenance facilities, administrative offices, staff housing, a system of restored prairies, the Carver family cemetery, the Carver Trail and the 1881 Moses Carver home.

George Washington Carver National Monument was established by an act of Congress on July 14, 1943 (57 Stat. 563, PL 7-148). The park is on The National Register of Historic Places (1966.)

The General Management Plan (1997) for GWCA states that the purpose of the park is to:

- *Memorialize the life of George Washington Carver as a distinguished African American, scientist, educator, humanitarian, Christian, artist, and musician.*
- *Preserve the setting of the Moses Carver farm and birthplace of George Washington Carver.*
- *Interpret the life, accomplishments, and contributions of George Washington Carver, using a museum, wayside exhibits, and other interpretive strategies.*

## Purpose and Need

The National Park Service's Management Policy (2001) and Director's Order 18 – *Wildland Fire Management* require that each park area with vegetation capable of sustaining fire develop a plan to manage fire on its lands. George Washington Carver National Monument needs to have a comprehensive and current fire management plan and program to protect the public and employees, natural and cultural resources, and park facilities; and to help meet the goals and objectives for the park that are listed in the GWCA *General Management Plan* and *Resource Management Plan*. These goals and objectives are discussed below.

## Objectives

The 1997 GWCA *General Management Plan* (GMP) contains the following management objectives (desired conditions) that pertain to the fire management program:

- *Expand and modify existing interpretive programs to provide for a greater understanding of George Washington Carver.*
- *Preserve the agrarian setting.*
- *Manage cultural and natural resources to memorialize Carver's life in a dignified and inspirational setting.*

- *Manage the park's resources so they can be used to help interpret how the boyhood farm and surrounding area influenced Carver as an adult.*
- *Explain the historical context in which Carver grew up and his efforts to get an education.*
- *Evaluate the human/natural/cultural resources and utilize them to a greater extent.*

The goals of the resource management program based upon the GMP are to preserve and protect the cultural and natural resources of the park. George Washington Carver National Monument currently consists of restored prairie, woodlands, and some developed areas. The prairie ecosystem was a part of the agrarian setting during the period George Washington Carver resided on the farm. Other areas of the Monument would have contained some plowed fields, orchards and other agrarian features. A cultural landscape study was conducted in 1998 (Harrington, et al.) The "agrarian landscape" definition will be reassessed during future General Management Planning and this plan will be revised if necessary to reflect any changes. In the meantime, the fire management program will help park managers rehabilitate the landscape to enhance the open and wooded areas of the site. In accordance with the current approved GMP, the National Park Service will continue to maintain the open prairie setting. The proposed projects will also assist in the protection of existing and future structures from unplanned wildland fire.

The goals of the park's cultural and natural resource management program as stated in the Resource Management Plan (1999) are as follows:

- *To study the park's flora, fauna, and natural systems to provide baseline data;*
- *To protect natural and cultural resources by identifying and mitigating threats to them; and,*
- *To restore the natural and cultural resources that are damaged, lacking, or absent due to past operations and activities of humans.*

The objectives of the fire management program are to:

- *Suppress all unscheduled ignitions.*
- *Ensure smoke production does not violate state and federal standards, and minimize smoke impacts to park neighbors.*
- *Assess and reduce hazardous fuels that pose potential threats to other resources to be protected (values at risk).*
- *Promote reestablishment of native plants, and reduce and/or eliminate invasive exotic plant species.*
- *Cooperate with partners and other interested parties on fire management issues.*
- *Ensure fire management actions are consistent with other planning documents.*

## **Scoping Issues and Impact Topics**

The Fire Management Plan will describe future park actions with respect to prescribed fire and wildland fire within park boundaries. The fire management actions will be based upon knowledge of fire behavior and fire effects, as well as the cultural and natural

resources and management objectives. The actions will be accomplished using prescriptions and management decisions designed to reduce or eliminate negative impacts to park resources. However, when implemented there is a possibility that the proposed actions would have adverse effects on cultural and natural resources within the park. Fire management actions will be designed to reduce or eliminate adverse impacts to neighbors and local communities. This Environmental Assessment will examine the types of potential impacts and the duration of the impacts.

## **Impact Topics**

Issues and concerns affecting this project were identified by NPS specialists as well as from the input of cooperating and interested parties. After internal scoping, issues and concerns were separated into distinct impact topics to facilitate the analysis of environmental consequences, which allows for a standardized comparison between alternatives based on the most relevant information. The impact topics below were identified on the basis of federal laws, regulations, and orders; NPS *Management Policies* (2001); and NPS knowledge of limited or easily impacted resources. Impact topics derived from internal and external scoping include air quality, cultural resources, visitor experience, vegetation, and wetlands.

## **Impact Topics Dismissed from Further Consideration**

The impact topics that were dismissed from further consideration based upon the input of NPS specialists and cooperating and interested parties include geological resources, water quality or quantity, streamflow characteristics, land use (occupancy, income, values, ownership, type of use), unique ecosystems, wildlife habitat, fish habitat, recreation resources, socioeconomics, and energy resources.

## **Prime and Unique Farmlands**

In August of 1980, the Council on Environmental Quality (CEQ) directed that federal agencies must assess the effects of their actions on farmland soils classified by the U.S. Department of Agriculture's Natural Resources Conservation Service (NRCS) as prime or unique. Prime or unique farmland is defined as soil that particularly produces general crops such as common foods, forage, fiber, and oil seed; unique farmland produces specialty crops such as fruits, vegetables, and nuts. According to the United States Department of Agriculture Soil Survey of Newton County, September 1989, there is "Prime Farmland" located within the park.

Generally, the land must be available for agricultural production tillage if it is to be classified as Prime Farmland. In the case of GWCA this land is being restored as native prairie and is not available for agricultural production tillage. However, if any areas are used for demonstrating historical agriculture production techniques in the future, the impacts will be assessed at that time (Kucera and Ehrenreich 1962).

## **Socioeconomic Environment**

The proposed action would neither change local and regional land use nor impact local businesses or other agencies. Implementation of the proposed action - particularly prescribed burning - may require temporary closures of project areas which may inconvenience some park visitors. Such closures, however, are likely to be small in size and of short duration. The impacts to park visitors are regarded as negligible. Therefore, the socioeconomic environment will not be addressed as an impact topic in this document.

## **Environmental Justice**

Executive Order 12898, "General Actions to Address Environmental Justice in Minority Populations and Low-Income Populations," requires all federal agencies to incorporate environmental justice into their missions by identifying and addressing disproportionately high and adverse human health or environmental effects of their programs and policies on minorities and low-income populations and communities. The proposed action would not have disproportionate health or environmental effects on minorities or low-income populations or communities as defined in the Environmental Protection Agency's Environmental Justice Guidance (1998). Therefore, environmental justice was dismissed as an impact topic in this document.

## **ALTERNATIVES CONSIDERED**

### **Alternative I - No-Action**

The fire management program under this alternative would continue under current management strategies, would suppress all wildland fire ignitions using the most effective means necessary; and would allow use of mechanical methods (mowing, weed whipping, tree removal), chemical treatments, and seeding selected species to manage and maintain cultural resources and cultural vistas. Chemical treatments would include Round-Up for honeysuckle, poison ivy, and multiflora rose control. Select 2 EC for Johnson grass and Remedy for lespedeza and sumac would also be applied as chemical control measures. All chemicals would be used in foliar applications, with a backpack sprayer. Prescribed fire was used in the past at George Washington Carver NM, but has been suspended since the Service-wide policy review in 1995 that required development or revision of Fire Management Plans.

Management actions would include:

- Use of mechanical and chemical treatments to reduce and/or eliminate non-native invasive species. For example, use herbicide treatments to reduce or eliminate the invasive exotic plants in the wetland areas.
- Use of chemical and mechanical treatments to maintain the long-term health of the tallgrass prairies.

- Herbicides and seeding with select native species would be used to reestablish and maintain the desired native vegetation.
- The use of mechanical treatments would be employed to reduce hazardous fuel build-ups that pose a threat to cultural and natural resources. Material generated by mechanical treatments would be manually removed from the site.

#### *Mitigation as Part of this Alternative*

A cultural resource manager will be assigned to the planning and implementation of each project to help mitigate potential negative impacts to cultural features and landscapes. A natural resource manager will be consulted during planning and development of each project to identify alien invasive species and proper treatment regime. Also, in accordance with Chapter 12 of RM-18, a monitoring plan will be developed and implemented to monitor the vegetation associated with each treatment area. This monitoring will allow managers to determine if project objectives have been met and, if not, how the treatment can be altered to meet the objectives.

#### **Alternative II – Appropriate Management Response and Integrated Fuels Management (Proposed Action)**

The fire management program under this alternative would suppress all wildland fire ignitions using the most appropriate management response. For example, this alternative would allow managers to use local roads and natural features as firelines rather than construct fireline that could have potential negative impacts on the natural and cultural resources. This alternative also allows for the use of prescribed fire, mechanical treatments and chemical herbicides, individually or in combination, to achieve cultural landscape, natural resource and fuels management goals and objectives as referenced in the General Management Plan and the Fire Management Plan. The goals of the GMP include preservation and restoration of the agrarian setting of the 1860-1870 period, management of cultural and natural resources to memorialize Carver's life in a dignified and inspirational manner, evaluation of the human/natural/cultural resources and utilization of them to a greater extent, and management of the park's resources so they can be used to help interpret how the boyhood farm and surrounding area influenced Carver as an adult. The goals and objectives of the FMP are directly subordinate to the Resource Management Plan, and include studying the park's flora, fauna, and natural systems to provide baseline data, protection of natural and cultural resources by identifying and mitigating threats to them, and restoration of natural and cultural resources that are damaged, lacking, or absent due to past operations and activities of humans. Chemical treatments would include Round-Up for honeysuckle, poison ivy, and multiflora rose control. Select 2 EC for Johnson grass and Remedy for lespedeza and sumac would also be applied as chemical control measures. All chemicals would be used in foliar applications, with a backpack sprayer.

All prescribed fires will be planned and approved in accordance with RM-18. Wildland fire use would not be permitted.

Management actions would include:

- Use of mechanical and chemical treatments, and prescribed fire to reduce and/or eliminate non-native invasive species. For example, use herbicide treatments combined with prescribed fire to reduce or eliminate the invasive non-native species in the wetland areas. Herbicide would be used to eliminate the plants and prescribed fire would be used to reduce the remaining biomass.
- Use of mechanical and chemical treatments and prescribed fire to restore and maintain the long-term health of the tallgrass prairie. Mechanical and chemical treatments would be used to reduce individual invasive plants that are currently out-competing the native species. Prescribed fire would be used to maintain the long-term health and viability of the tallgrass prairie.
- Herbicides, prescribed fire, and seeding with select species would be used to reestablish and maintain native grass communities where needed.
- Mechanical and chemical treatments and prescribed fire would be used to reduce hazardous fuel build-ups that pose a threat to cultural and natural resources. Material generated by mechanical treatments can be manually removed from the site or eliminated through prescribed burning. Prescribed fire and further mechanical treatment would be used to maintain the desired conditions.

#### *Mitigation as Part of this Alternative*

A cultural resource manager will be assigned to the planning and implementation of each project to help mitigate potential negative impacts to cultural features and landscapes. A natural resource manager will be consulted during planning and development of each project to identify alien invasive species and proper treatment regimes. Also, in accordance with Chapter 11 of RM-18, a monitoring plan will be developed and implemented to monitor the vegetation associated with each treatment area. This monitoring will allow managers to determine if project objectives have been met and, if not, how the treatment can be altered to meet the objectives.

#### **Alternative III – Wildland Fire Use**

Under this alternative, a full range of available fire management strategies including appropriate management response, wildland fire use (the use of natural wildland fire ignitions to meet resource management objectives) and prescribed fire would be used. All ignitions would be subjected to Stage 1 analysis pursuant to the *Wildland and Prescribed Fire Management Policy: Implementation Procedures Reference Guide* (USDI/USDA 1998). All prescribed fires will be planned and approved consistent with the method and format required by RM-18. This alternative also allows for the use of mechanical treatments and chemical herbicides.

Management actions would include:

- Use of unplanned natural wildland fire ignitions to meet natural and cultural resource management objectives.



- Use of mechanical and chemical treatments, and prescribed fire to reduce and/or eliminate non-native invasive species. For example, use herbicide treatments combined with prescribed fire to reduce or eliminate the invasive non-native species in the wetland areas. Herbicide would be used to kill the plants and prescribed fire would be used to reduce the remaining biomass.
- Use of mechanical and chemical treatments and prescribed fire to restore and maintain the long-term health of the tallgrass prairie. Mechanical and chemical treatments would be used to reduce individual invasive plants that are currently out competing the native species. Prescribed fire would be used to maintain the long-term health and viability of the tallgrass prairie.
- Herbicides, seeding with select species, and prescribed fire would be used to reestablish and maintain native grass communities where needed.
- Use mechanical and chemical treatments and prescribed fire to reduce hazardous fuel build-ups that pose a threat to cultural and natural resources. Material generated by mechanical treatments can be manually removed from the site or eliminated through prescribed burning. Prescribed fire and further mechanical treatment would be used to maintain the desired conditions.

#### *Mitigation as Part of this Alternative*

A cultural resource person will be assigned to the planning and implementation of each project to help mitigate potential negative impacts to cultural features and landscapes. A natural resource management person will be consulted during planning and development of each project to identify alien invasive species and proper treatment regime. Also, in accordance with Chapter 11 of RM-18, a monitoring plan will be developed and implemented to monitor the vegetation associated with each treatment area. This monitoring will allow managers to determine if project objectives have been met and, if not, how the treatment can be altered to meet the objectives.

#### **Alternative IV – No Management**

Under this alternative, all unscheduled wildland fire ignitions would be allowed to burn unimpeded by management action. Prescribed fire, mechanical treatment and chemical herbicides use would not be allowed.

#### **Explanation of Suppression Operations for Alternatives**

The suppression operations referred to in Alternative I will be to quickly respond to wildland fires and utilize the most direct suppression techniques available that meet the park requirements for protection of cultural and natural features. The suppression techniques used under this alternative have the potential to cause negative impacts on resources within the park. Firefighters may be exposed to less safe conditions due to the direct type of suppression tactics they could be implementing, such as constructing fireline directly along the flanks or directly attacking the head of the fire. Suppression operations in Alternatives II and III will be to quickly respond to wildland fires and utilize a wider range of suppression techniques, ranging from direct suppression action to using local roads and natural features as firelines, to achieve effective control of the fire with the least amount of damage to the park's natural and cultural resources. These

suppression techniques reduce the potential exposure of firefighters to erratic fire behavior and other risk factors. The wildland fire use option in Alternative III would allow for management of unplanned ignitions for resource benefit. This alternative has been reviewed and rejected. Suppression would not be utilized under Alternative IV.

## **Alternatives Considered and Rejected**

### *Alternative III – Wildland Fire Use*

This alternative has been considered and rejected because it does not meet the objectives under the Purpose and Need. One of the objectives is to suppress all unscheduled ignitions, and Alternative III does not meet that purpose. Also, is not feasible to safely manage a wildland fire to achieve resource benefit within the limited size of GWCA.

### *Alternative IV – No Management*

This alternative has been considered and rejected because it will not comply with Director's Order 18, could threaten the integrity of GWCA cultural resources and cultural landscapes, and does not ensure the safety of park visitors and employees, and surrounding landowners.

## **Environmentally Preferred Alternative**

The environmentally preferred alternative is determined by applying the criteria suggested in the National Environmental Policy Act of 1969 (NEPA), which is guided by the Council on Environmental Quality (CEQ). The CEQ provides direction that “the environmentally preferable alternative is the alternative that will promote the national environmental policy as expressed in NEPA’s Section 101” (*Forty Most Asked Questions Concerning Council on Environmental Quality’s National Environmental Policy Act Regulations*, 1981.)

Section 101 of the National Environmental Policy Act states that “...it is the continuing responsibility of the Federal Government to ... (1) fulfill the responsibilities of each generation as trustee of the environment for succeeding generations; (2) assure for all Americans safe, healthful, productive, and aesthetically and culturally pleasing surroundings; (3) attain the widest range of beneficial uses of the environment without degradations, risk to health or safety, or other undesirable and unintended consequences; (4) preserve important historic, cultural, and natural aspects of our national heritage and maintain, wherever possible, an environment which supports diversity and variety of individual choice; (5) achieve a balance between population and resource use which will permit high standards of living and a wide sharing of life’s amenities; and (6) enhance the quality of renewable resources and approach the maximum attainable recycling of depletable resources.” The environmentally preferable alternative for this project is based on these national environmental policy goals.

*Alternative I - No-Action* would suppress all wildland fires, and allow for the use of mechanical and chemical treatments, and seeding of selected species to manage and

maintain the natural and cultural resources and cultural vistas. This alternative would allow for an increased potential of ground disturbing activities during wildland fire suppression operations. There would also be increased ground disturbing activities from mechanical treatments because prescribed burning will not be an option. Therefore, this alternative would not result in the same level of protection of natural and cultural resources and people over the long-term as would occur with the preferred alternative. Consequently, the no-action alternative does not satisfy provision 4 of NEPA's Section 101.

*Alternative II – Appropriate Management Response and Integrated Fuels Management* would provide for continued suppression of all unscheduled wildland fire ignitions using the most appropriate management response. This allows managers to choose a suppression alternative that would minimize ground disturbing activities, such as using existing roadways and mowed areas. This alternative would also provide for use of prescribed fire, mechanical treatments and chemical herbicides used individually or in combination to achieve natural resource, cultural landscape and fuels management objectives. The wildland fire suppression operations for this alternative would ultimately provide for better protection of natural and cultural resources, and health and safety of visitors and employees. This alternative would satisfy each of the provisions of the national environmental policy goals.

The *environmentally preferable alternative* is *Alternative II – Appropriate Management Response and Integrated Fuels Management* because it surpasses Alternative I in realizing the full range of national environmental policy goals as stated in §101 of the National Environmental Policy Act.

## Summary

**Table 1: Methods Each Alternative Uses to Ensure Each Objective is Met**

Objective	Alternative I	Alternative II
Provide for firefighter and public safety <sup>1</sup>	Mechanical reduction of hazardous fuels would reduce risk of intense fires; aggressive suppression may still expose fire-fighters and the public to some elevated risk	Appropriate management response would allow greater flexibility in ensuring firefighter and public safety. Prescribed fire and mechanical reduction of hazardous fuels would reduce risk of intense fires.
Avoid violation of air quality standards	Wildland fires would be fought aggressively to ensure the least amount of smoke production possible.	Appropriate management response to unplanned wildland fire could be adjusted to minimize smoke production. Timing and ignition patterns of prescribed burning can be adjusted to reduce potential adverse air quality impacts.
Protect and preserve cultural resources	Cultural resources would be protected through avoidance of activities which could adversely impact such resources and/or modification of mechanical treatment applications to	Same as Alternative I, except that use of the appropriate management response would allow greater flexibility in suppression activities, thus providing an increased protection

	minimize the potential for adverse impact. Aggressive suppression may have an elevated potential to damage cultural resources	of cultural resources by avoiding suppression techniques and locations that may themselves damage cultural resources.
Avoid undue impacts to visitor experience	Visitor access would be limited or prohibited, as necessary, during wildland fire suppression operations or when mechanical and/or chemical treatments are being applied. Interpretive opportunities exist concerning invasive non-native species and their treatment.	Same as Alternative I. Prescribed fire treatment areas can be used as interpretive opportunities to explain the natural role of fire in tallgrass prairie ecosystems.
Maintain natural vegetation which contributes to historic landscape and interpretation	Treatments would be designed to favor the response for desirable vegetation and minimize potential for proliferation of invasive nonnative species. Aggressive suppression may result in elevated impact to vegetation as a result of suppression locations and methods.	Treatments would be designed to favor the response for desirable vegetation and minimize potential for proliferation of invasive nonnative species. Use of the appropriate management response in suppression actions would reduce the potential for suppression-induced impacts to vegetation.
Avoid undue adverse impacts to floodplains and wetlands	Mechanical treatments can be designed (location, timing) to avoid or minimize adverse impacts to floodplains and wetlands. Aggressive suppression activities may encroach on wetlands and floodplains with attendant increased potential for adverse impact.	Prescribed fire and mechanical treatments can be designed (location, timing) to avoid or minimize adverse impacts to floodplains and wetlands. Use of an appropriate management response will allow avoidance of floodplains and wetlands in suppression activities.

<sup>1</sup> Although firefighter and public safety is not listed among the management objectives, it is the first objective which must be considered in all fire-related activities

**Table 2: Comparison of Alternatives**

Objective	Alternative I	Alternative II
Provide for firefighter and public safety <sup>1</sup>	Firefighter and public safety would be maintained through appropriate planning, utilizing LCES and hazard analyses, imposing temporary closures, etc.	Firefighter and public safety would be maintained through appropriate planning, utilizing LCES and hazard analyses, imposing temporary closures, etc. Appropriate suppression response allows a greater range of suppression strategies which increases firefighter and public safety.
Avoid violation of air quality standards	Aggressive suppression should limit smoke production from unplanned ignitions.	Appropriate design of prescribed fires will limit smoke production; emissions modeling can be conducted to estimate impact at sensitive receptors. Appropriate management response may result in incrementally more smoke from wildland fires on some occasions.

Protect and preserve cultural resources	Mechanical treatments will be designed to avoid or minimize potential adverse impacts to historic structures and maintain desired cultural landscapes.	Prescribed fires and mechanical treatments will be designed to avoid or minimize potential adverse impacts to historic structures and maintain desired cultural landscapes. Appropriate management response will consider protection of cultural resources.
Avoid undue impacts to visitor experience	As necessary, visitor access will be limited or prohibited during wildland fires and mechanical and/or chemical treatments.	Same as Alternative I. Visitor access will also be limited or prohibited during prescribed fire operations.
Maintain natural vegetation which contributes to historic landscape and interpretation	Mechanical treatments can be used to maintain open cultural landscapes. Aggressive suppression actions may disturb sensitive species. Lack of prescribed fire may negatively impact native species.	Mechanical and prescribed fire treatments can be used to maintain open cultural landscapes. Prescribed fire has an advantage in being able to favor or discourage selected species through prescription specifics. Appropriate suppression response can avoid sensitive species or communities, thus reducing adverse impact to those resources.
Avoid undue adverse impacts to floodplains and wetlands	Adverse impacts may result from aggressive initial attack and suppression activities. No adverse impacts should arise from mechanical or prescribed fire treatments.	Appropriate management response provides for strategic alternatives that can avoid suppression activities in floodplains and wetlands. No adverse impacts should arise from mechanical or prescribed fire treatments.

**Table 3: Summary Comparison of Impacts**

Objective	Alternative I	Alternative II
Provide for firefighter and public safety <sup>1</sup>	Firefighter safety is protected through use of mechanical treatments to reduce hazardous fuels. Aggressive fire suppression poses greater risks than an appropriate management response.	Firefighter safety is protected through use of prescribed fire and mechanical treatments to reduce hazardous fuels. The ability to employ an appropriate management response provides the greatest protection of firefighter and public safety in suppression actions.
Avoid violation of air quality standards	Impacts would be short-term and minor to moderate in specific areas	Impacts would be short-term and minor to moderate in specific areas
Protect and preserve cultural resources	Negligible impacts to cultural resources from mechanical treatments. Some potential for minor adverse impacts from suppression activities.	Negligible impacts to cultural resources from mechanical and prescribed fire treatments. Use of appropriate suppression response to unplanned ignitions reduces possibility of adverse impacts due to suppression activities. This alternative should result in the lowest level of potential adverse impact.
Avoid undue impacts to visitor	The alternative will have minor impacts due to temporary, short-term closures due to wildland fire or	The alternative will have temporary minor impacts due to short-term closures for wildland and prescribed

experience	mechanical and/or chemical treatments.	fire operations, and mechanical and/or chemical treatments.
Maintain natural vegetation which contributes to historic landscape and interpretation	Lack of prescribed fire could have a moderate impact on native vegetation. Mechanical projects may be beneficial in maintaining desired vegetation. Negative impacts from mechanical treatments should be short-term and negligible to minor. Aggressive suppression activities have the potential to cause local and minor adverse impacts.	Impacts from prescribed fire and mechanical treatments should be short-term and negligible to minor. Use of appropriate management response should reduce potential suppression-related impacts. This alternative should be beneficial in achieving and maintaining desired vegetation.
Avoid undue adverse impacts to floodplains and wetlands	Impacts should be negligible to minor. Aggressive suppression activities may have greater adverse impact than Alternative II.	Impacts should be negligible to minor. Appropriate management response should result in suppression activities that minimize impacts to floodplains and wetlands.

## **AFFECTED ENVIRONMENT & ENVIRONMENTAL CONSEQUENCES**

Park managers have reviewed critical cultural and natural resources that may be impacted by this project. Impact topics have been selected on the basis of significant resources and the potential for beneficial or adverse effects on them by each alternative as required by law, regulation, and NPS policy.

### Cumulative Impacts

Impacts to cultural and natural resources may be direct, indirect, or cumulative. Direct effects are caused by an action and occur at the same time and place as the action. Indirect effects are caused by the action and occur later in time or further removed from the place, but are still reasonably foreseeable.

The Council on Environmental Quality (CEQ), which implements the National Environmental Policy Act, requires assessment of cumulative impacts in the decision-making process for federal projects. Cumulative impacts were determined by combining the effects of the preferred alternative with other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions (40 CFR 1508.7). Therefore, it was necessary to identify other ongoing or reasonable foreseeable future projects within the George Washington Carver National Monument area and, if applicable, the surrounding region. Cumulative impacts are considered for both the no-action and preferred alternatives.

### Impairment of Park Resources or Values

In addition to determining the environmental consequences of the preferred and other alternatives, National Park Service policy (Management Policies, 2001) requires analysis of potential effects to determine whether or not actions would impair park resources.

The fundamental purpose of the national park system, established by the Organic Act and reaffirmed by the General Authorities Act, as amended, begins with a mandate to conserve park resources and values. National Park Service managers must always seek ways to avoid, or to minimize to the greatest degree practicable, adversely impacting park resources and values. However, the laws do give the National Park Service the management discretion to allow impacts to park resources and values when necessary and appropriate to fulfill the purposes of a park, as long as the impact does not constitute impairment of the affected resources and values. Although Congress has given the National Park Service the management discretion to allow certain impacts within parks, that discretion is limited by the statutory requirement that the National Park Service must leave park resources and values unimpaired, unless a particular law directly and specifically provides otherwise. The prohibited impairment is an impact that, in the professional judgment of the responsible National Park Service manager, would harm the integrity of park resources or values, including the opportunities that otherwise would be present for the enjoyment of those resources or values. An impact to any park resource or value may constitute impairment. An impact would be more likely to constitute impairment to the extent that it has a moderate or severe adverse effect upon a resource or value whose conservation is:

- necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the park;
- key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park; or
- identified as a goal in the park's general management plan or other relevant National Park Service planning documents.

Impairment may result from National Park Service activities in managing the park, visitor activities, or activities undertaken by concessionaires, contractors, and others operating in the park.

A determination has been made that none of the proposed projects will constitute impairment.

## **AIR QUALITY**

**Affected Environment.** A professional lichen study conducted in 1992 (Wetmore) found no significant threats to the park's air quality. Other surveys have also been conducted (Isbell, 1983, Baxter et al, 1985, Baxter and Vineyard, 1985). Monitoring stations in the nearby four-state area collect data on suspended particles, heavy metals, fine particles, and pollutants such as sulfur dioxide, nitrogen dioxide, ozone, and carbon dioxide. This data would be representative of the air quality at the park, if further information was needed.

Currently, The Missouri Department of Natural Resources, Air and Land Division monitors air quality pollutants statewide. The closest air quality monitoring station is located in

Carthage, Missouri, 9 miles north of the park. Missouri is considered to be in attainment by the U.S. Environmental Protection Agency (2003).

**Methodology.** All available information on air quality was compiled. Intensity of effects is defined below.

*Negligible* – Impact barely detectable and not measurable; if detected, would have slight effects.

*Minor* – Impact measurable but short-term and localized (within a three mile radius of the monument). No mitigation measures would be necessary.

*Moderate* – Changes in air quality would be measurable and would have consequences to sensitive receptors, but effects would be localized (within a three mile radius of the monument). Mitigation measures necessary and likely effective.

*Major* – Changes in air quality measurable would have substantial consequences to sensitive receptors. Mitigation measures necessary and success of measures not assured.

### **Regulations and Policies**

Current laws and policies require that the following conditions be achieved in the park:

*Desired Conditions:* Air quality related values would be protected from pollution sources emanating from within park boundaries.

*Source* – Clean Air Act; NPS Organic Act; NPS *Management Policies* (2001).

### **Impacts of Alternative I - No-Action**

*Impact Analysis* - Under the no-action alternative temporary (usually less than 24 hours) minor to moderate adverse impacts to air quality would occur. Wildland fires and mechanized equipment used to cut vegetation would still produce temporary air quality impacts. Smoke from wildland fires could produce short-term moderate impacts, however fire suppression tactics used in the alternative would focus on extinguishing the fire as quickly as possible which would minimize smoke production because the total number of acres burned would be minimized.

*Cumulative Effects* – Due to the short-term nature of these management activities (usually one to two days), this alternative would not contribute to cumulative effects on air quality. Air quality in the park would continue to be impacted from daily vehicle emissions and other management activities.

*Conclusion* – The no-action alternative would have temporary minor to moderate impacts to air quality in site-specific areas due to wildland fire and use of mechanized equipment. However, these impacts would be directly related to fulfilling specifically



identified project objectives for mechanical treatments; and wildland fire smoke impacts would be minimized due to suppression tactics.

This alternative will not cause impairment.

### **Impacts of Alternative II – Proposed Action**

*Impact Analysis* – Wildland fire suppression, vegetation removal by mechanical treatment and prescribed fire would cause temporary minor to moderate adverse impacts to air quality. The method of wildland fire suppression could prolong air quality impacts because tactics will be employed to minimize other potential resource damage, so wildland fires could burn longer and burn more total acres, leading to minor to moderate smoke impacts. Smoke from prescribed fire can be minimized by altering ignition patterns and burning during the time of day when smoke dispersal would be maximized, however moderate impacts could occur.

*Cumulative Effects* – Because of the short duration of the project this alternative would not contribute to the cumulative impacts of air quality over the long-term. Air quality in the park would always be impacted from daily vehicle emissions and other management activities.

*Conclusion* – These activities would have a temporary minor to moderate adverse impact on air quality in the site-specific project area. However, these impacts would be directly related to fulfilling specifically identified project objectives for prescribed fire and mechanical treatments. Wildland fire smoke impacts may be increased because of the modified suppression tactics.

This alternative will not cause impairment.

## **CULTURAL RESOURCES**

**Affected Environment.** George Washington Carver National Monument is composed of a 210-acre tract of land that was part of the 240-acre farm of Moses Carver. This farm was the birthplace and home of George Washington Carver until he was approximately 12 years old. The entire Monument has been placed on the National Register of Historic Places (NRHP Nomination, 1966). Excepted structures are the Visitor Center, Maintenance Building, Fire Suppression Pump Building, Comfort Station, Well #2 Building, Discovery Center Trailer, and three Mission 66 Period Housing Structures. These have been determined to be non-contributing elements of the Monument and are not on the National Register of Historic Places. The park contains the 1881 Moses Carver home, and cultural landscape features such as the Carver family cemetery and open prairie meadows – some of which were cultivated fields in George Washington Carver's day. A cultural landscape study was completed, but is not considered to be comprehensive in nature (Harrington et al, 1998.) There are also documented archaeological sites that include the location of the cabin where George

Washington Carver was born, two other homes sites belonging to relatives of Moses Carver, and some small lithic scatters.

**Methodology.** All available information from the Master Plan (1968), Cultural Landscape Report, and internal park documents was compiled and used to assess impacts of the projects on cultural resources. The following definitions were used in analyzing effects on cultural resources.

*Negligible* – The impact is at the lowest levels of detection, barely perceptible and not measurable.

*Minor* – The impact is slight and localized within a relatively small area of a site or group of sites, but is measurable or perceptible.

*Moderate* – The impact is measurable and perceptible, but does not diminish the integrity of the affected resource.

*Major* – The impact is substantial, noticeable and permanent.

### **Regulations and Policies**

Current laws and policies require that the following conditions be achieved in the park:

*Desired Condition:* Inventory, protection, preservation and enhancement of cultural resources based upon documented data from appropriate investigation and research. In terms of prescribed fire and mechanical treatments, this especially applies to the Moses Carver home, the cemetery, and the cultural landscape.

*Source* – National Historic Preservation Act; Executive Order 11593; Archeological and Historic Preservation Act; Archeological Resources Protection Act; the Secretary of the Interior's Standards and Guidelines for Archeology and Historic Preservation; Programmatic Memorandum of Agreement Among the NPS, Advisory Council on Historic Preservation, and the National Council of State Historic Preservation Officers (1995); NPS Organic Act; NPS Management Policies.

### **Impacts of Alternative I – No Action**

*Impact Analysis* - Under the no-action alternative, project activities would occur that would have negligible impacts to cultural landscapes. Aggressive wildland fire suppression tactics could potentially have an adverse impact on cultural sites, primarily through soil disturbance and compaction by mechanical equipment. Mechanical treatments will be designed to avoid damage to cultural resources. Reseeding to establish native vegetation will aid in stabilizing the cultural resources. The reseeded can be associated with rehabilitation after wildland fire or as a planned activity after mechanical treatment. However, not having the ability to use prescribed fire could limit the success of reseeded projects because prescribed fire aids in the establishment of reseeded areas by preparing a good seedbed and aid with nutrient cycling in the soil.

This will lead to increased impacts from mechanical treatments due to the lack of ability to use prescribed fire.

*Cumulative Effects* – The no-action alternative could have adverse cumulative effects on the cultural resources and surrounding areas due to aggressive fire suppression actions for unplanned ignitions. However, the impacts on the cultural landscape from proposed mechanical and chemical treatment projects would afford better long-term protection for the cultural resources due to restoration of a lower fire intensity ecosystem in the wetland areas, and reduction of hazardous fuels near developed areas.

*Conclusion* – The no-action alternative would result in minor impacts to the integrity of the park's cultural landscapes. Wildland fire suppression actions could lead to long-term adverse impacts. Mechanical treatments would aid in restoration and maintenance of the cultural resources and landscape for which the park was established; and are key to the natural integrity of the park. However, as discussed above, lacking the ability to use prescribed fire could limit the success of reseeding projects, allow for the spread of invasive species and lead to increased impacts from mechanical treatments.

This alternative will not cause impairment.

### **Impacts of Alternative II – Proposed Action**

*Impact Analysis* - Under Alternative II project activities would occur that would have negligible impacts to cultural landscapes. Wildland fire suppression tactics would be designed to minimize impacts by avoiding suppression techniques and locations that may damage cultural resources and landscapes. Prescribed fire and mechanical treatments would be designed to maintain cultural landscapes while avoiding damage to cultural resources; and can be utilized to reduce hazardous fuel which, in turn, will decrease potential damage from wildland fire. The ability to use prescribed fire will aid with reseeding project success by creating good seedbeds in the soil for the propagation of the seeds.

*Cumulative Effects* – The preferred alternative would not contribute to the cumulative effects on cultural resources. The impacts on the cultural landscape from proposed projects would afford better long-term protection for the cultural resources due to restoration of a lower fire intensity ecosystem in the wetland areas, and reduction of hazardous fuels in the developed areas.

*Conclusion* – Proposed management actions would have negligible to minor impacts on cultural resources. Wildland fire suppression techniques would be designed to minimize cultural and natural resource impacts, and provide a safer working environment for firefighters. Prescribed fire and mechanical treatments would aid in restoration and maintenance of the cultural resources and landscape for which the park was established; and are key to the natural integrity of the park.

This alternative will not cause impairment.

## **VISITOR EXPERIENCE**

**Affected Environment.** George Washington Carver National Monument was established to educate people about his childhood and the forces that influenced his character and life. The visitor experience can include a visit to the visitor's center and museum, a hike on the trail, and a visit to the 1881 Moses Carver home. The visitor experience can also include learning about native tallgrass prairie, which can be facilitated by visiting the restored prairies within the Monument.

**Methodology.** All available information on visitor experience was compiled from the General Management Plan (1997). Intensity of effects is defined below.

*Negligible* – The impact is barely detectable, and/or will affect few viewsheds.

*Minor* – The impact is slight, but detectable, and/or will affect some viewsheds.

*Moderate* – The impact is readily apparent and/or will affect many viewsheds.

*Major* – The impact is severely adverse or exceptionally beneficial and/or will affect most viewsheds.

### **Regulations and Policies**

Current laws and policies require that the following conditions be achieved in the park:

*Desired Condition:* Maintain and preserve, in a suitable and enduring manner, the birthplace of George Washington Carver as a public national memorial for the benefit and enjoyment of the people of the United States. The GMP specifies that these conditions can be reached through several means, including managing cultural and natural resources to memorialize Carver's life, and managing resources to help interpret the boyhood farm and surrounding area to show how it influenced Carver as an adult.

*Source* – NPS Organic Act, NPS *Management Policies* (2001), GWCA General Management Plan (1997)

### **Impacts of Alternative I - No-Action**

*Impact Analysis* - Under the no-action alternative, activities would occur that could cause negligible to minor short-term (time until the site is no longer black due to ash) negative impacts to the visitor experience. The trail and the Carver House could be temporarily closed due to wildland fire suppression operations, and the implementation of mechanical and chemical treatments on hazardous fuels and invasive non-native plant species. However, there would be no closures for prescribed fire under this alternative. Also, there can be negative visual impacts from mechanical mowing equipment and from more aggressive fire suppression techniques, such as the use of a tractor plow.

*Cumulative Effects* – The no-action alternative would not contribute to long-term cumulative effects on the visitor experience. Restoration and maintenance of native grasses and reduction of hazardous fuels will help restore a more balanced natural ecosystem and enhance the visitor experience.

*Conclusion* – Project activities would occur under this alternative that would have temporary negligible to minor short-term negative impacts to the visitor experience. Aggressive wildland fire suppression activities have the potential to cause negative impacts on the visual quality. Restoration and maintenance of natural resources would lead to a more balanced ecosystem that is less susceptible to unplanned wildland fire, and would afford more protection to the cultural resources and developed areas that provide the basis for the visitor experience.

### **Impacts of Alternative II – Proposed Action**

*Impact Analysis* - Under the preferred alternative, activities would occur that would impact the visitor experience in a short-term negligible to minor way. The trail and the Carver House could be temporarily closed due to wildland fire suppression and prescribed fire operations, and the implementation of mechanical and chemical treatments on hazardous fuels and invasive non-native plant species. However, there will be fewer negative visual impacts from more aggressive fire suppression techniques, such as the use of a tractor plow, because of the use of alternative suppression methods. There would also be fewer negative visual impacts associated with mowing equipment. There would be an increase in closures due to prescribed fire operations and temporary appearance of black vegetation as a result of the burns. However, this would lead to increased opportunities to discuss the natural fire regimes of native tallgrass prairie, and the use of prescribed fire for prairie restoration.

*Cumulative Effects* – The preferred alternative would not contribute to long-term cumulative effects on soil erosion. Wildland fire suppression techniques, mechanical and chemical treatments, and prescribed fires would be designed to decrease impacts on the visitor experience.

*Conclusion* – Project activities would occur under this alternative that would have short-term negligible to minor impacts on the visitor experience. The wildland fire suppression techniques and prescribed fire operations would be designed to limit the impact on visitors. The ability to balance the use of prescribed fire will create more opportunities for closures, but will also present opportunities for fire ecology education. Restoration and protection of natural and cultural resources would lead to a greater visitor experience.

## **VEGETATION**

**Affected Environment.** The park manages both grassland and forest. Grasslands cover approximately two-thirds of the park and are in various stages of native prairie restoration. A Restoration Action Plan has been developed to guide these efforts. Forested areas occur primarily along streams, but extend into the uplands. The picnic area and the Visitor

Center/ Headquarters building complexes are highly managed and manicured with a large proportion of those areas planted in non-native trees and shrubs.

Park grasslands are in a highly disturbed state due to previous intensive land uses, such as cultivation or use as pasture. Recent studies in the nearby Diamond Grove Prairie, a relatively undisturbed, state-owned natural area, have provided a species composition model to assist in the restoration of the park's prairies. The five prairie areas were burned in the spring of 1982 and seeded with a mixture of native grasses. Large areas, totaling approximately 80 acres, were farmed in the last 30 years under a variety of special use permits. The park has utilized seeding, planting, mowing, haying, and prescribed burning to maintain and restore the prairie. Currently, there are approximately 130 acres of prairie grassland in the park. Some of the units have responded well to the management actions, while others have been less responsive. The Prairie Restoration Action Plan contains a species list and discussion of current native prairie management strategies.

A 1984 survey of Diamond Grove Prairie by the Missouri Department of Conservation (Solecki et al, 1986) listed the most important species for cover and diversity, providing a model for fire restoration of the prairie at the monument. Grass species include big bluestem (*Andropogon gerardi*), little bluestem (*Schizachyrium scoparium*), Indian grass (*Sorghastrum nutans*), prairie dropseed (*Sporobolus heterolepis*), June grass (*Koeleria cristata*), panic grass (*Dichanthelium latifolium*) and bluestem (*Andropogon temarius*). The forb species include Sampson's snakeroot (*Psoralea psoralioides*), milkwort (*Polygala sanguinea*), Barbara's buttons (*Marshallia caespitosa*), sensitive briar (*Schrankia uncinata*), lobelia (*Lobelia spicata*), sedge (*Fimbristylis caroliniana*), tickseed (*Coreopsis grandiflora*), sundrops (*Oenothera linifolia*), lousewort (*Pedicularis canadensis*), false dragonhead (*Physostegia angustifolia*), goat's rue (*Tephrosia virginiana*), ashy sunflower (*Helianthus mollis*), pencil flower (*Stylosanthes biflora*), New Jersey tea (*Ceanothus americanus*), pale purple coneflower (*Echinacea pallida*), pasture rose (*Rosa carolina*), blazing star (*Liatris pycnostachya*), and beardtongue (*Penstemon tubaeformis*).

The woodlands of the monument are considered part of the oak-hickory forest association that is characteristic of most forests in southwestern Missouri. The park woodlands are small in area (no one section is more than about 20 acres) and show a variation of this mix, with proportionally small amounts of oak and very little hickory. A high occurrence of American elm (*Ulmus americana*), hackberry (*Celtis occidentalis*), and osage orange (*Maclura pomifera*) is indicative of some form of disturbance, most likely grazing and/or plowing. Other species found within the woodlands include black cherry (*Prunus serotina*), black walnut (*Juglans nigra*), hawthorn (*Crataegus* sp.), bur oak (*Quercus macrocarpa*), red cedar (*Juniperus virginiana*), and ash (*Fraxinus pennsylvanica*). These are indicative of a lowland early succession community of an oak-hickory forest.

Historically, the woodlands were apparently restricted to narrow bands along the streams. Jackson and Bensing (1982) suggest that oak and hickory dominated the narrow, riparian bands of woody species during the time of George Washington Carver. The tree species probably included bitternut hickory (*Carya cordiformis*), shagbark hickory (*Carya ovata*), white oak (*Quercus alba*), red oak (*Quercus rubra*), and black oak (*Quercus velutina*) as

the dominant species. Secondary species that may have been present include pignut hickory (*Carya glabra*), black walnut (*Juglans nigra*), black cherry (*Prunus serotina*) and American basswood (*Tilia americana*). Suppression of natural fire and introduction of agriculture has led to invasion of the prairie areas by trees. Jackson (1985) suggests that approximately 90 percent of the woody vegetation was within ten feet of either side of the stream banks as recent as the 1940's. Since the dedication of the park in 1953, the small woodland communities have been allowed to regenerate and expand far beyond their original distribution impacting other vegetative communities. Alternatively, Benn (1982) suggests the current distribution of woodlands is similar to that of the 1860-1870 period.

A discussion of invasive plants and proposed treatments is located in Appendix A.

**Methodology.** All available information on vegetation was compiled from the Resource Management Plan (1999), General Management Plan (1997), Prairie Restoration Action Plan (1995) and various literature. Predictions about short- and long-term site impacts were based on this information. Intensity of impacts is defined below.

*Negligible* – An action that may cause changes to the vegetation structure, but the change will be so small that it will not be of any measurable or perceptible consequence to the population.

*Minor* – An action that may cause changes to the vegetation structure, but the change will be small and that if it is measurable, it will be a small and localized consequence to the population.

*Moderate* – An action that will cause changes to the vegetation structure, and the change will be measurable and will have a sufficient consequence to the population, but is more localized.

*Major* – An action that will cause a noticeable amount of change to the vegetation structure, and the change will be measurable and will have a substantial and possible permanent consequence to the population.

### **Regulations and Policies**

Current laws and policies require that the following conditions be achieved in the park:

*Desired Condition:* Manage to achieve greatest diversity and health of native vegetation, and allow for reintroduction of native species.

*Source* – NPS Organic Act, NPS *Management Policies* (2001), National Environmental Policy Act, Executive Order 13112 Invasive Species

### **Impacts of Alternative I - No-Action**

*Impact Analysis* - Under the no-action alternative, activities would occur that could cause moderate vegetation impacts. This alternative does not allow for use of prescribed burning, which could lead to increased impacts to the vegetation by

mechanical equipment. Also, prescribed fire benefits the establishment of native vegetation by preparing a good seedbed for plant establishment, and this would not be available under this alternative. Mechanical and chemical treatments and seeding projects would be designed to favor the response by the desired vegetation; and minimize proliferation of invasive nonnative species and other negative impacts, such as soil disturbance. Wildland fire events cannot be managed to produce desired changes in vegetation; and aggressive suppression activities may have adverse impacts on vegetation due to location and methods selected to suppress the fire.

Assessment and reduction of hazardous fuels would lessen the potential for large or unusually intense fires. Restoration of the oak-hickory forest would allow for a more open understory will help reduce fire intensities of unplanned ignitions, as well as prescribed fires. The establishment and maintenance of native grass, control of invasive species, and the restoration and maintenance of the oak-hickory forest would help restore the cultural scene.

*Cumulative Effects* – The no-action alternative would contribute to long-term changes in the structure of the vegetation. Wildland fire suppression techniques could cause adverse impacts. The establishment and maintenance of native grass, control of invasive species, and the restoration and maintenance of the oak-hickory forest would help mitigate impacts on vegetation from unplanned ignitions, and help restore the cultural scene.

*Conclusion* – Project activities would occur under this alternative that would have negligible to moderate vegetation impacts. Mechanical and chemical treatments would be designed to cause negligible to moderate positive localized changes to the overstory and understory. Aggressive suppression techniques could have localized adverse impacts on vegetation.

This alternative will not cause impairment.

### **Impacts of Alternative II – Proposed Action**

*Impact Analysis* - Under this alternative, activities would occur that could cause negligible to moderate vegetation impacts. Project impacts would ultimately be beneficial because they would establish and maintain desirable native vegetation which would decrease the potential for large wildland fires and restore the cultural scene. Prescribed fire is widely considered the best tool for restoring tallgrass prairies. Prescribed fire activities, such as ignition patterns and timing of burns, can be designed to produce the desired change in vegetation such as maximizing the response of desired vegetation, preparing a good seed bed for seeding activities, and minimizing potential for proliferation of nonnative species. Wildland fire events cannot be managed to produce desired changes in vegetation, however appropriate management response suppression activities should reduce suppression-related impacts on vegetation. Mechanical and chemical treatment of vegetation would be developed to target just the vegetation that should be removed.



Assessment and reduction of hazardous fuels would lessen the potential for large or unusually intense fires. Restoration of the oak-hickory forest would allow for a more open understory will help reduce fire intensities of unplanned ignitions, as well as prescribed fires. The establishment and maintenance of native grass, control of invasive species, and the restoration and maintenance of the oak-hickory forest would help restore the cultural scene.

*Cumulative Effects* – This alternative would contribute to long-term changes in the structure of the vegetation. The establishment and maintenance of native grass, control of invasive species, and restoration and maintenance of the oak-hickory forest would help mitigate impacts on vegetation from unplanned ignitions and help restore the cultural scene.

*Conclusion* – Project activities would occur under this alternative that would have negligible to moderate vegetation impacts. Wildland and prescribed fire, and mechanical treatments can be managed to cause minor to moderate positive localized changes to the overstory and understory. The establishment and maintenance of native grass, and the restoration and maintenance of the oak-hickory forest would help restore the cultural scene.

This alternative will not cause impairment.

## **WETLANDS and FLOODPLAINS**

**Affected Environment.** The park topography consists of gently rolling uplands dissected by stream channels that carry water from natural springs and excess water during rainy periods. The stream valleys have a stepped appearance and bedrock outcrops are infrequent except along deeper streams and rivers.

Three small streams, Carver, Harkins and Williams, occur in the park. Harkins Branch and Williams Branch flow into Carver Branch. Carver and Williams streams originate as springs and have historical and natural significance. Carver Spring is historically important as a part of George's early associations with the farm. Williams Spring was the main water source for the Williams family home site.

Carver Branch is a small spring-fed stream that flows across the park primarily from east to west. The watershed for Carver Branch, north and east of the park, includes livestock pasture, residential areas, and cropland.

Williams Branch originates at a spring near the foundation of the Williams spring house. In the 1930's a concrete dam was constructed approximately 100 feet downstream from this spring to form a one-half acre pond. The dam was removed in the late 1970's and replaced by an earthen levee. Williams Pond is not a part of the 1860-1870 historic scene, yet it is a well-established ecosystem.

Harkins Branch flows across the northwest corner of the park through some of its least-disturbed areas. The watershed includes an intensive, heavily grazed, dairy cattle operation just north of the park boundary.

Several areas of the park experience wet conditions throughout much of the year. For example, the south-central, west-central, and east-central portions often have standing water in them during the winter and spring. Some of the water results from runoff, while much of it results from ground water seepage. Also, run-off from storms can present a threat to the museum collection, the historic structures, and the park's natural resources. In addition, there is a great potential for flooding along Carver Branch with the extensive agricultural use within its three-mile drainage area and the 100-foot elevation drop between its source and the park entrance.

**Methodology.** All available information on wetland and floodplains was compiled from the Resource Management Plan (1999) and the General Management Plan (1997). Predictions about short- and long-term site impacts were based on this information. Intensity of effects is defined below.

*Negligible* – Impacts barely perceptible or below detection levels.

*Minor* – Changes to water quality, hydrology, and aquatic organisms in rivers and streams detectable but short-term and relatively small. No mitigation would be necessary.

*Moderate* – Changes to water quality, hydrology, and aquatic organisms in river and streams readily apparent, long-term, but localized. Mitigation to offset adverse effects could be necessary, and would likely be successful.

*Major* – Impacts to water quality, hydrology, and aquatic organisms severe or of exceptional benefit long-term and over a long segment of rivers and streams. Mitigation to offset adverse effects would be necessary, but success is not assured.

### **Regulations and Policies**

Current laws and policies require that the following conditions be achieved in the park:

*Desired Conditions:* Minimize destruction, loss, or degradation of wetlands and floodplains, and preserve their natural and beneficial values.

*Source* – NPS Organic Act, NPS *Management Policies* (2001), Clean Water Act, Executive Order 11988 Floodplain Management, Executive Order 11990 Protection of Wetlands

### **Impacts of Alternative I - No Action**

*Impact Analysis* – Under this alternative, project activities would occur that could have negligible to minor impacts on wetlands. Mechanical and chemical treatments would be designed to minimize or eliminate negative impacts to wetland areas. Wildland fires and suppression operations would be managed to minimize impacts; however, the

aggressive suppression operations under this alternative could have moderate localized adverse impacts on wetlands. This could occur because fireline could be constructed in or near wetland areas. There is always potential for wildland fire to burn into the wetland area and cause negative impacts. Managers can replant native vegetation where possible in wetland areas to help restore the areas after wildland fire.

*Cumulative Effects* – The no-action alternative could contribute to long-term (one year or longer) cumulative effects on wetlands and floodplains based upon use of more aggressive suppression techniques. Management prescriptions can be designed to minimize impacts on wetlands, however negative impacts are possible.

*Conclusion* – This alternative could have negligible to minor impacts on wetlands. The management prescriptions utilized can minimize or eliminate negative impacts on wetlands. Aggressive wildland fire suppression techniques can lead to adverse impacts on wetlands.

This alternative will not cause impairment.

### **Impacts of Alternative II – Proposed Action**

*Impact Analysis* – Under this alternative, project activities would occur that could have negligible to minor impacts on wetlands. Prescribed burns and mechanical and chemical treatments can be designed to minimize or eliminate negative impacts to wetland areas. Wildland fire suppression operations could be managed to minimize or eliminate impacts to wetlands. This can be accomplished by not constructing fireline in or near wetland areas. There is always potential for wildland fire to burn into the wetland area and cause negative impacts. Managers can replant native vegetation where possible in wetland areas to help restore the areas after wildland fire.

*Cumulative Effects* – This alternative would not be likely to contribute to long-term cumulative effects on wetlands and floodplains. Management prescriptions for all activities can be designed to minimize impacts on wetlands.

*Conclusion* – This alternative could have negligible to minor impacts on wetlands. The management prescriptions for prescribed fire and mechanical and chemical treatments can minimize or eliminate negative impacts on wetlands. Appropriate suppression response for wildland fire suppression will help minimize adverse impacts on wetland areas.

This alternative will not cause impairment.

## **CONSULTATION/COORDINATION**

### **Agencies/Organizations/Persons Contacted**

Elizabeth Anderson, Wildland Fire Associates, Denver, Colorado

Scott J. Bentley, Superintendent, GWCA

Harry E. Hansen, Chief of Maintenance, GWCA

Lana Henry, Chief Ranger, GWCA

Rob Klein, Fire Ecologist, Ozark National Scenic Riverways

Dena Matteson, Park Ranger, GWCA

Dan O'Brien, Wildland Fire Associates, Central Point, Oregon

**Preparer**

Elizabeth Anderson, Wildland Fire Associates

**List of Recipients**

*Federal Agencies*

*State Agencies*

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## APPENDIX A

### Invasive Plants at George Washington Carver National Monument

#### A. Tall Fescue (*Festuca arundinacea*)

Tall fescue is a perennial, cool-season grass. The exact history of this species at the park is unknown. Since it has been widely planted in this part of Missouri for pasture forage, it can be assumed that at least a portion of the park's population originated from planted stock in, or adjacent to, the park (previous owners). Also, the park's development subzone has been seeded for many years with K-31 fescue (commercial seed), and much of the fescue cover from this area has carried over into the prairie. As a result, control methods in many areas of the park will undoubtedly be continual.

Nevertheless, fescue is the most troublesome and widespread of the exotic species in the park. Although there is no quantitative data available, fescue is prominent in all of the seven prairie units. In some units, as 4 and 5, the species is scattered throughout, but all units have substantial cover around their perimeters.

#### *Recommended Control Methods:*

- Initial chemical control of fescue around unit perimeters in spring (during boot to early seedhead stage).
- Chemical control in heavily-infested areas (i.e. unit 4 and 2) after first heavy fall frost.
- Conduct prescribed burn the year after chemical treatment in heavily infested areas; in spring after growth stage has been elevated above the ground (boot to early seedhead stage).
- Chemical control in other infested areas (those not yet treated) after first heavy fall frost (as need arises).
- Do not use chemical treatment in consecutive years in the same area.
- Continue, in alternate years, chemical treatment of perimeter areas in spring.

#### B. Johnsongrass (*Sorghum halepense*)

This grass is apparently a rather recent (in the last few years) adventive in the park. Field checking of the units in 1992 found the species to be quite numerous (but scattered) in unit 5, with isolated stands in units 2 and 6. More populations will undoubtedly be discovered. It is believed to have originated from adjacent lands. This is a warm-season, perennial, rhizomatous, and very competitive species.

#### *Recommended Control Methods:*

- Bi-weekly spot-mowing during growth stages (mid-summer) to prevent seed production and reduce rhizome dry matter levels.
- application of Fusilade 2000 (fluazifop-P-butyl) at post-emergence growth stage (before seed heads form).

Due to the abundance of this species in unit 5, chemical application of Fusilade is recommended to slow the spread of the species. Any areas missed with this application during the first growing season should be mowed before seed heads begin forming. Chemical application should continue in subsequent years until population is eradicated.

### **C. Kentucky bluegrass (*Poa pratensis*)**

This species is a naturalized, cool-season perennial. Its origin in the park is unknown, but it is quite prevalent in some of the prairie units, particularly unit 4, where it forms a dense lower canopy, even within stands of native grass species. Further research will probably show other substantial populations.

#### *Recommended Control Methods:*

- Prescribed burn conducted in late spring (early May) to units showing substantial amounts of the species and showing substantial cover of desirable native species.
- Follow-up burns in consecutive years if needed.
- Chemical treatment is not recommended.

### **D. Japanese honeysuckle (*Lonicera japonica*)**

This vine is a semi-evergreen species that has apparently become widespread in this region over the last century. Populations in the park are well-established, covering many areas of the forest, forest edges, and prairies. One plant may often cover several square meters of ground, competing with native species for space, moisture, and nutrients. Assessment of the population is fairly easy during the winter season, as the plants remain green most of the year.

#### *Recommended Control Methods:*

- Mechanically remove the plants and stump-treat with Garlon 4 or Roundup after the first heavy fall frost.
- If the area is particularly sensitive (rare plants in the vicinity, near a site of historic importance, a high visitor use area, etc.) or the plant is judged too large to effectively remove, then foliar treatment with Roundup can be used during the same period as above.
- An assessment of the visitor impacts and safety considerations must be made before control is attempted in or near visitor use areas.

### **E. Osage orange (*Maclura pomifera*)**

A small tree or shrub, osage orange (also known simply as "hedge" or "hedge-apple") is of dubious origin in this part of the United States. Historically, it has been planted for fence rows, due to its thicket-forming, thorny character. Stands of this species are prevalent in scattered locations, especially around Harkins Branch and much of the forest perimeter.

#### *Recommended Control Methods:*

- Tree-sized plants - cut plant and stump-treat with Garlon 4 or Garlon 3A.
- Seedlings - as above; can also be controlled by mowing during leaf stage or prescribed burning.

Plants in prairie areas and perimeters should be given priority, using the stump treatment method of chemical application. Until a full woodland vegetation survey is conducted, insufficient information exists for assessment and treatment of the woodlands.

### **F. Crown vetch (*Coronilla varia*)**

This plant has been used extensively in southwest Missouri for erosion control around highway right-of-ways and other construction projects. It is a mat-forming perennial forb with creeping stems. In 1992, a stand of this species was found in the center of unit 1. It was 30-40 feet in diameter and essentially monotypic. No other populations are currently known in the park.

#### *Recommended Control Methods:*

- Chemical treatment (foliar).
- Spring prescribed burn to control seedlings.

The only known stand of this species in the park, unit 1, should be treated chemically due to its large size. Subsequent control should be achieved by rotation of the unit through the burn cycle. Should further study reveal more populations, these should be spot-treated chemically.

### **G. Musk thistle (*Carduus nutans*)**

A biennial or winter annual forb, this highly competitive, noxious species has become a problem in many areas of Missouri. At George Washington Carver, a few individual plants were found in south-east unit 7 and north unit 6. No other plants were observed.

#### *Recommended Control Methods:*

- Hand-pulling of individual plants.
- Prescribed burn to increase competitive pressure on the plants.
- Chemical application to rosettes in March/April or September/November



The first option is recommended for the park, due to what little is currently known about the population. Any blooming plants (before seeding) located should be pulled from the ground, ensuring that the entire root crown is removed and that the flower heads are completely destroyed after the plants are removed from the field (studies have shown that the heads may mature after being cut).

#### **H. Multiflora rose (*Rosa multiflora*)**

A woody shrub, this species has been planted in many areas for fence rows. Its status at the park is unknown, although it is included on Palmer's plant list (with a specimen in the park's herbarium).

##### *Recommended Control Methods:*

- Mowing during the summer.
- Prescribed burn (on regular prairie burn cycle).
- Cut and stump-treat with herbicide during the fall (the species is still in leaf and can be recognized easily).

Any plants found should be chemically treated. Prescribed burn schedules should control future populations.

#### **I. Black locust (*Robinia pseudoacacia*)**

A tree or shrub, this species has been found to invade prairie areas in Missouri. The status of the species at the park is unknown, yet it is included on Palmer's list (and in the park's herbarium).

##### *Recommended Control Methods:*

- Cut and stump treat with Garlon 4, or Tordon RTU.
- Foliar application of Garlon 4 or Crossbow.

Recommend initial stump treatment with Garlon 4, and follow-up treatment of seedlings (foliar) with Garlon 4 until control is achieved. Both types of treatments should occur before the first frost in the fall (early/mid-September).

#### **J. Sericea lespedeza (*Lespedeza cuneata*)**

This species was introduced into the United States, and has been used extensively (including in Missouri) for erosion control and forage. There is little information about the park status of this species. One plant was identified along Harkins Branch (at the west boundary), but more may be located if further studies are conducted.

*Recommended Control Methods:*

- Close mowing during early and mid-summer (not during late summer).
- Chemical application of Roundup during August.
- Chemical application of Garlon 3A or 4A (triclopyr) or metsulfuron during the vegetative or early-bloom stages.
- Hand-pulling is not recommended, as the plants respond well to such disturbance.

Insufficient information exists on the status of this species in the park to formulate a control plan. Any plants found should be spot-treated chemically with Garlon.

**K. Others**

Woody plants, such as poison ivy (*Toxicodendron radicans*), American elm (*Ulmus americana*), smooth sumac (*Rhus glabra*), hackberry (*Celtis*, sp.), and blackberries (*Rubus*, sp.), encroach upon several portions of the prairie units. This is particularly evident in the western portions of units 1 and 3, southeast unit 7, and north unit 4. Although not exotic species, these nevertheless warrant attention.

*Recommended Control Methods:*

- Cut and stump-treat with chemical herbicide (Garlon).
- Prescribed burn.

During years that each unit is not scheduled for burning, woody plants should be controlled annually in at least the areas where they are abundant (units 1, 2, 3, 4, and 7). Cut stems and apply Garlon.